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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/010,816	11/13/2001	Qi Wang	980.1077US01	7282

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ALTERA LAW GROUP, LLC
6500 CITY WEST PARKWAY
SUITE 100
MINNEAPOLIS, MN 55344-7704

EXAMINER
KIANNI, KAVEH C

ART UNIT	PAPER NUMBER
2877	

DATE MAILED: 01/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/010,816	WANG ET AL.
	Examiner	Art Unit
	Kevin C Kianni	2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 November 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 November 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .

4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: .

DETAILED ACTION

Claim Objections

1. Claims 35 and 36 are objected to because of the following informalities: the phrase 'travelling' is misspelled, see lines 16 and 19, page 22. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

- This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sappey (US 6,421,481).

Regarding claim 1, Sappey teaches an optical device (shown at least in fig. 1), comprising: a multi-channel port 16; a plurality of single-channel ports 14 with at least

one of the multi-channel 16 and the single-channel ports 14 including aperture (as shown in fig. 1, item input/output channel ports 14/16 consist of input/output apertures for inputting/outputting signals y_{1-n}); and an optical system (shown at least in fig. 1, items 18-20) with wavelength-dependent (see fig. 1, item grating 20 and y_{1-n}), free-space paths y_{1-n} (see col. 6, lines 26-45; wherein wavelengths y_{1-n} travel in free-space/in the air) couple light between the single-channel ports 14 and the multi-channel ports 16, the waveguide aperture (apertures of input/output channels 14/16) coupled to one of the wavelength-dependent (see fig. 1, item grating 20 and y_{1-n}) free-space paths y_{1-n}.

However, Sappey does not specifically teach wherein in first embodiment one of the aforementioned above ports include a waveguide with a cross-sectional dimension that is smaller at an internal portion of the waveguide than at an aperture of the waveguide. Nevertheless Sappey teaches this limitation in other embodiments (see fig. 21, item 270; see at least col. 4, lines 50-56 and col. 17, lines 24-34 and 51-58). Thus, it would have been obvious to a person of ordinary skill in the art when the invention was made to combine/modify different embodiments of Sappey's optical system such as by including one or more of the input/output ports with that of the fiber 270 in order to construct an optical device that include above limitation, since such modification(s) are compatible in different embodiments of Sappey and since the resultant optical device would provide a flat-toped filter response for (de)multiplexers while reducing costs and overcoming dispersion loss (col. 3, lines 23-25+).

The statements advanced in claim 1, above, as to the applicability and disclosure of Sappey are incorporated herein.

Regarding claims 2-19, Sappey further teaches wherein the waveguide aperture cross-sectional dimension is increased relative to the internal portion in a single direction (shown in fig. 21, item 270); wherein the waveguide aperture cross-sectional dimension is increased relative to the internal portion in two, orthogonal directions (see fig. 21, item 270, and col. 4, lines 49-56); wherein light propagates from the plurality of single-channel ports 14 to the multi-channel port 16; wherein light propagates from the multi-channel port to the plurality of the single-channel ports (see col. 14, lines 5-10+); wherein the optical system includes a single converging optical subsystem and a wavelength dispersive assembly 20/22, the single converging optical subsystem 18 coupling the single channel ports 14 and the multi-channel port 16 to the wavelength-dispersive assembly 20/22 (shown at least figures 1 and 8, item(s) optical/light converging elements including lens(s)); wherein the converging optical subsystem includes a lens 18 that collimates light propagating towards the wavelength-dispersive assembly 20/22 and focuses light propagating from the wavelength-dispersive assembly 20/22 along at least one of the free-space optical paths y_{1-n}; wherein the converging optical subsystem includes a lens array (shown at least in fig. 12, items 116 and 118); wherein the wavelength-dispersive assembly is a diffraction grating disposed in a Littrow configuration (see col. 7, lines 25-51); wherein the wavelength-dispersive assembly is a diffraction grating (see col. 7, lines 25-51) and a mirror disposed in a Litmann-

Metcalf configuration (see at least col. 12-col. 13, line 17, wherein the combination of a reflector and a diffraction grating constitute Litmann-Metcalf configuration, which is analogous to applicant's definition of this phrase in specification, parag. 40 for fig. 5); wherein the multi-channel and single-channel ports are disposed in a linear array (see fig. 1, items 14 and 16); wherein the multi-channel port is located at one end of the linear array (see fig. 1, items 16); wherein the optical system contains a wavelength-dispersive element (see fig. 8, items 64, 72, and 74), a first converging optical subsystem 68 disposed on the wavelength dependent paths between the plurality of single-channel ports 76 and the wavelength-dispersive element 64, and a second converging optical subsystem 62 disposed on the wavelength-dependent paths between the multi-channel port (fig. 8, item output fiber having input wavelengths 62) and the wavelength-dispersive element 64 (see col. 12, line 66-col. 13, line 16+); wherein light propagates from the plurality of single-channel ports to the multi-channel port (fig. 8, item 76 and output fiber having input light 62); wherein light propagates from the multi-channel port to the plurality of single-channel ports (see col. 14, lines 5-10+); wherein the wavelength-dispersive element is a diffraction grating 72; wherein the diffraction grating is a transmission diffraction grating (see fig. 8, item72); wherein the first and second converging optical subsystems each include at least one lens that interacts with light propagating along at least one free space optical path (see fig. 8, item 2); wherein at least one of the first and second converging optical subsystems include a lens array (see col. 11, lines 27-33).

The statements advanced in claim 1-19, above, as to the applicability and disclosure of Sappey are incorporated herein.

Regarding claim 20-21 and 29, Sappey teaches an optical wavelength division multiplexed (WDM) communications system (shown at least in fig.1, see abstract), comprising:

(A): a WDM transmitting unit (see col. 17, lines 38; also see col. 1, lines 49-56); a WDM receiving unit (see col. 1, lines 49-61 also col. 13, lines 12-16); and an optical transport system/ a fiber optic network/ a free space link coupled to transmit a multi-channel optical signal from the transmitting unit to the receiving unit (the transport system is an optical means that facilitates coupling between the transmitting and receiving unit otherwise the optical system of sappy would be inoperable, see col.. 6, lines 11-18 in which various optical devices can be used as means of communications), at least one of the transmitting unit and the receiving unit including an optical device, including:

(B): a multi-channel port; a plurality of single-channel ports with at least one of the multi-channel and the single-channel ports including a waveguide with a cross-sectional dimension that is smaller at an internal portion of the waveguide than at an aperture of the waveguide; and an optical system with wavelength-dependent, free-space paths that couple light between the single-channel ports and the multi-channel ports, the waveguide aperture coupled to one of the wavelength-dependent, free-space paths.

Regarding the above limitations (B) the arguments presented in rejection of claim 1 are analogous in rejection of claim 20.

Regarding claims 22, 26-28 and 31, Sappey further teaches; wherein at least one of the channels in the multi-channel signal has a wavelength greater than 1.5 μm and less than 1.65 μm (see col. 8, lines 45-63); wherein the fiber optic network includes at least one switching device selected from the group of optical on/off switches, optical passing switches, static optical add-drop multiplexers, configurable optical add-drop multiplexers, and optical cross-connect switches (see at least fig. 12, item 114); wherein the optical device is coupled between a plurality of light sources operable at different wavelengths on an input side and the optical transport system at an output side, light from the plurality of light sources being combined into a multi-channel signal in the optical device (see at least fig. 8, items single channel signals y_{1-n} travelling between input/output, input being a transmitting antenna /laser diodes and output unit being detectors, see col. 17, lines 38 and col. 13, lines 12-16; see col. 1, lines 49-61); wherein the optical device is coupled between the optical transport system at an input side, and a plurality of receivers operable at different wavelengths on an output side, the light from the multi-channel source being separated into single-channel signals within the device (see at least fig. 8, item s single channel signals y_{1-n} travelling between input/output, input being a transmitting antenna /laser diodes and output unit being detectors, see col. 17, lines 38 and col. 13, lines 12-16; see col. 1, lines 49-61); wherein at least one of the transmitting unit and the receiving unit includes a telescope

68 (see fig. 8, item 68, wherein the 'telescope' prevents further divergence of light by redirecting the beam to next optical element).

Regarding claims 23, 24-25 and 30, Sappey further teaches wherein various optical elements can be added between the optical transmission and receiving paths (see col. 6, lines 11-18), and at least one of the channels in the multi-channel signal has a wavelength range of 1.46-1.52 μm (see col. 14, lines 14-21). But Sappy does not teach wherein the fiber optic network includes at least one optical fiber amplifier and at least one channel power equalizer and wherein the above range is between 0.75-1.1 μm and/or 1.3-1.4 μm (see col. 8, lines 45-63). It would have been obvious to person of ordinary skill in the art when the invention was made to modify Sappy's optical communication system transmission wavelength range to include above limitation since producing such range with additional <u>conventional</u> optical elements would provide enhancement in reduction of optical dispersion noise having a flat-toped filter response (col. 3, lines 23-35) and further it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

The statements advanced in claims 1-19, above, as to the applicability and disclosure of Sappey are incorporated herein.

Regarding claim 32, Sappey teaches a method of forming a multi-channel optical signal (shown at least in fig. 1 and see abstract), which comprises: optically coupling a

plurality of single-channel ports 14 to a multi-channel port 16 along wavelength-dependent free-space optical paths y_{1-n}; and reducing the angular spread of the free-space optical path at a coupling aperture of at least one of the plurality of single-mode ports 14 and the multi-frequency port 16 by including a waveguide with a cross-sectional dimension (see waveguides 14/16 cross-section; see at least col. 9, lines 1-20, specifically lines 15-21). Regarding the size/aperture of the above waveguide(s) the arguments presented in rejection of claim 1 is analogous in rejection of claim 32.

Regarding claims 33 and 34, the arguments presented in rejection of claims 5 and 4 are, respectively, analogous in rejection of claims 33 and 34.

Regarding claims35-39, Sappey further teaches interacting the light traveling along the free-space paths with a converging optical subsystem (shown at least figures 1 and 8, item(s) optical/light converging elements including lens(s)); interacting the light traveling along the free-space paths with a plurality of converging optical subsystems (shown at least figures 1 and 8, item(s) optical/light converging elements including lens(s)); directing the light along the plurality of the free-space paths with a dispersive optical subsystem 20/22; wherein directing the light along the plurality of the free-space paths includes illuminating a diffraction grating and a mirror in a Littman-Metcalf configuration (shown at least figures 1 and 8, item(s) optical/light converging elements including lens(s)); wherein directing the light along the plurality of the free-space paths illuminating a diffraction grating in a Littrow configuration (see col. 7, lines 25-51).

Citation of Relevant Prior Art

4. Prior art made of record and not relied upon is considered pertinent to applicant's disclosure. In accordance with MPEP 707.05 the following references are pertinent in rejection of this application since they provide substantially the same information disclosure as this patent does. These references are:

Son 6317233 teaches conventional optical elements such as power equalizers and optical amplifiers in a communication system.
Bouevitch et al. 6,498,872 relevant in rejection of at least claim 1
De Donno et al. 2002/0015560 with fo. pr. 1998
Pan 6459844
Cheng 6014254
Dianov et al. 6125225
Wu 6321006

These references are cited herein to show the relevance of the apparatus/methods taught within these references as prior art.

Contact Information

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Cyrus Kianni whose telephone number is (703) 308-1216.

The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 6:00 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font, can be reached at (703) 308-4881.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 872-9306 (for formal communications intended for entry)

or:

Hand delivered responses should be brought to Crystal Plaza 4, 2021 South Clark Place, Arlington, VA., Fourth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703) 308-0956.

Kevin Cyrus Kianni
Patent Examiner
Group Art Unit 2877

January 7, 2004